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Reports on Schuylkill River interceptor sewer through Fairmount Park, 1868-1872

Manuscript ledger book containing reports relating to construction of intercepting sewer along the Schuylkill River in Philadelphia, Pennsylvania, to protect the water supply from pollution by upstream factories and domestic sewage. The reports date from 1868 to 1872, and are from various engineers to John C. Cresson, chief engineer of Fairmount Park, through which much of the sewer would pass. The report authors are John D. Estabrook, principal assistant engineer; R. [Rudolph] Hering, Assistant Engineer; and Robert S. Ralston. Included are several drawings or sewer cross sections, and a section of an 1868 map of Fairmount Park, showing three different routes for the proposed sewer. [See “Map of farms and lots embraced within the limits of Fairmount Park as appropriated for public use by act of assembly approved the 14th day of April AD 1868”]. These reports predate by more than a dozen years the actual construction of the sewer, which began in the early 1880s. The drainage report is also an early and detailed look at the various chemicals used in a variety of factories in the Schuylkill watershed, and a good overview of the pollution that was entering the river at that time. The reports take up only the first 35 pages of the ledger book. Pages 1 through 6, 16, and 29 are blank and were not scanned. This item was originally cataloged as PWD 2010.005.0001.

PHILADELPHIA WATER DEPARTMENT
HISTORIAL COLLECTION

Fairmount Park October 1868

John. C. Cresson
Cheif Engineer
Sir

In submitting the Plan And Profile of the survey for determining the location and practicability of a sewer to drain Manayunk & vicinity, I would beg leave to offer a few additional facts and suggestions bearing on the subject. The Territory desired to be drained extends from near Flat Rock Dam above Manayunk to Laurel Hill Cemetary and from the Schuylkill eastwardly to ground that turns water to the Delaware.

The surface in many places is steep and broken and at present drains into creeks that flow into the the Schuylkill. In the villiage of Manayunk four service sewers collect much of the surface and street drainage and conduct it under the Canal to the Schuylkile. Many of these streets have steep grades and heavy showers in Summer sweeps vast quantities of dust and sand into the sewers and thence into the River. Few of the dwellings in the vicinity are connected with the common sewers, the sewage being emptied into Cesspools instead so that at present the mass of surface drainage can injure the water of the Schuylkill but little and we find the chief source of impurities in the manufacturing establishments dye Houses. &c

A majority of these (and the most difficult to provide for being the lowest) are located on the Island formed by Manayunk Canal and the River. And on ground subject to overflow in times of freshet. The most feasable way to drain this district seems to be to collect the sewage in one main drain, locating this in the street so far as that continues on the Island thence through private property and near the Tow-path to the lower end of the Island just above the locks thene pass under the Canal to main street thence near the River Bank and cross the Wissahickon at its mouth or making a wide detour and crossing the Wissahickon above Ridge Avenue striking the River Bank again at the uper end of Falls Village near Wolffendens Mill Thence keep quite near the River to Fairmount Basin, tunnel under that and empty into the Schuylkill below the Wire Bridge. The distance from the crossing under the Canal at Manayunk to the mouth is about 30.000 feet by the shore route and 937 feet further to make the detour to Ridge Avenue at the Wissahickon, To cross the Wissahickon at its mouth involves backing the Water on Dobsons Mill and destroying that water power while crossing above Ridge Avenue would not interfere with it.

Either route provides means to drain all the Mills except a few dye Houses &c on the Island that are so low as to be caught by ordinary freshets. All dwellings and stores are above this Level and can readily be drained into the sewer proposed. To build a Sewer on the Island by the River Bank or low enough to serve all the buildings and drains as now constructed would be very expensive at first and would require the constant expense of pumping to raise the sewage high enough at the lower end of the island to flow to Fairmont Again a sewer located below ordinary freshet level would be liable to be blocked and inoperative much of the time. The Available fall from the point of crossing under Manayunk Canal to half tide in the Schuylkill at the proposed outlet is twenty-one feet in a distance of 30.000 or a fall of 0.7 feet per 1000. feet or 3.7 ft per mile. The fall of Croton Aqueduct New, York, is 1.1 ft. per Mile and of Cochituate Aqueduct Boston is 0.25 ft per Mile The Least inclination adopted for Main Sewers in Boston is 1ft. in 1200 ft. 4. 4 ft. per. Mile. In Chicago some of the sewers have less than two feet fall per Mile but these require flushing and occasional hand cleaning while that has not been found necessary in Boston. In considering size of sewer required the per Centage of impure Sewage compared with the quantity of surface drainage is so small that it would not be advisable and

hardly practicable to provide means to carry off the whole product of the numerous small creeks or even that of the common sewers during heavy showers Connections of the latter with the Main could be provided with flood gates so arranged that when the product of the Common sewer rose a few inches above the ordinary flow the entrance to the main would be entirely closed and the whole products of the Common Sewer forced to flow over a weir and directly into the River. till the excess abated when the ordinary course would be resumed by the flood gate opening. This Arrangement would prevent the silt swept. in by the Showers from Blocking the Main sewer. Probably a sewer three feet in diameter would be large enough to carry off the present sewage from the Mills and ordinary flow from service sewers, but slight rains would double this quantity. Again the present imperfect system of house drainage is not likely to continue but will be forced more generally into service sewers thus increasing

the demands on the main. The quanity of sewage is likely to vary considerabley from day to day so as to avoid having the current much diminished when the quanity is small an egg shaped section with small end down might be adopted. This form would be less likely to collect silt but would in construction require 12 to 15 per cent. more material than a circular section of the same capacity. The location and grade indicated, brings nearly three miles of the sewer foundation below water level in the Schuylkill adjoining, but for the lower two miles of this, from Columbia Bridge to the outlet it is practicable to keep far enough from the River Bank to avoid much trouble. Above Columbia Bridge for a mile a form of construction with iron base and Brick top could be adopted, that would not require a dry trench.
To keep entirely above this water level would give only about half the inclination and probably require the sewer to be cleared of silt occasionally by hand. The Plan and Profile indicate but few obstructions and show that the work can be readily constructed at moderate cost.

Respectfully submitted
(signed) John. D Estabrook

Fairmont Park March 28th 1870

John C. Cresson
Chief Eng
Sir

I have the honor to report the following results of further examinations relative to the location and cost of a sewer from Manayunk to Fairmont. In the report and plans submitted in 1868 a line was proposed following near the east bank of the Schuylkill and having a fall of about one (1) inch per one hundred (100) feet. A rate of fall materially greater than this cannot be had without raising the sewage either at Manayunk at some point between there and Laurel Hill which would involve much additional first cost and the constant expense of maintaining pumping power
The location then suggested seems best suited to existing conditions except perhaps for that portion of the line south of Laurel Hill, when by tunnelling a shorter and probably less costly route can be had
The size of sewer necessary to carry off the refuse from the present manufacturing establishments at Manayunk would not exceed three (3) feet in Diameter but eventually much street and house drainage should be provided for and a sewer of four times that capacity or six (6) feet in Diameter is recomended from opposite, Green lane to the Falls Village.
For this portion the Circular section would be cheaper and requiring less height would be better adapted to pass under Manayunk Canal and over Wissahickon Creek. At the same time it would form a less conspicuous line along the low river bank than a higher section. From the Falls to the outlet an Oval section equivalent to seven (7) feet circular diameter would provide for the increase of sewage admitted at that village while the increased height would not be objectionable as a drive would follow the same route and should be raised above that level. From Laurel Hill to Fairmont the bottom of the sewer would be at or below water level in the Schuylkill. It is therefore advisable to keep far enough from that stream to avoid the use of coffer dams or sheet piling. Three routes for this portion have been examined. The first following near the Schuylkill as proposed in the previous report avoids tunnelling except at Fairmont but would encounter much soft ground and water from the River during its construction. The second proposes to tunnel from the Edgeley tract to opposite Engle & Wolfs brewery and from thence to tunnel under the connecting

railroad and under Lemon Hill and Fairmount.
The Third would require a tunnel almost the entire distance from South Laurel Hill to the outlet following nearly a direct line between those points.

The relative cost for this section by the three different routes is as follows

For the first $400.687.50
" " Second 358.390.50
" " Third 351.945.90

The rest of the line is estimated to cost
$503.291.50 making a Total
I $1.084.775.00 By the River route
II $1.034.018.00 by the route passing Engle & Wolfs
III 1.026.283.00 by the direct route

For details of construction location and cost, the accompanying plans, profiles and report have been prepared By Asst. Eng. Rudolph Herring

The Second route or the one that passes near Engle & Wolfs seems to be least objectionable

Resp
(Signed) John. D. Estabrook
F. A. Eng.

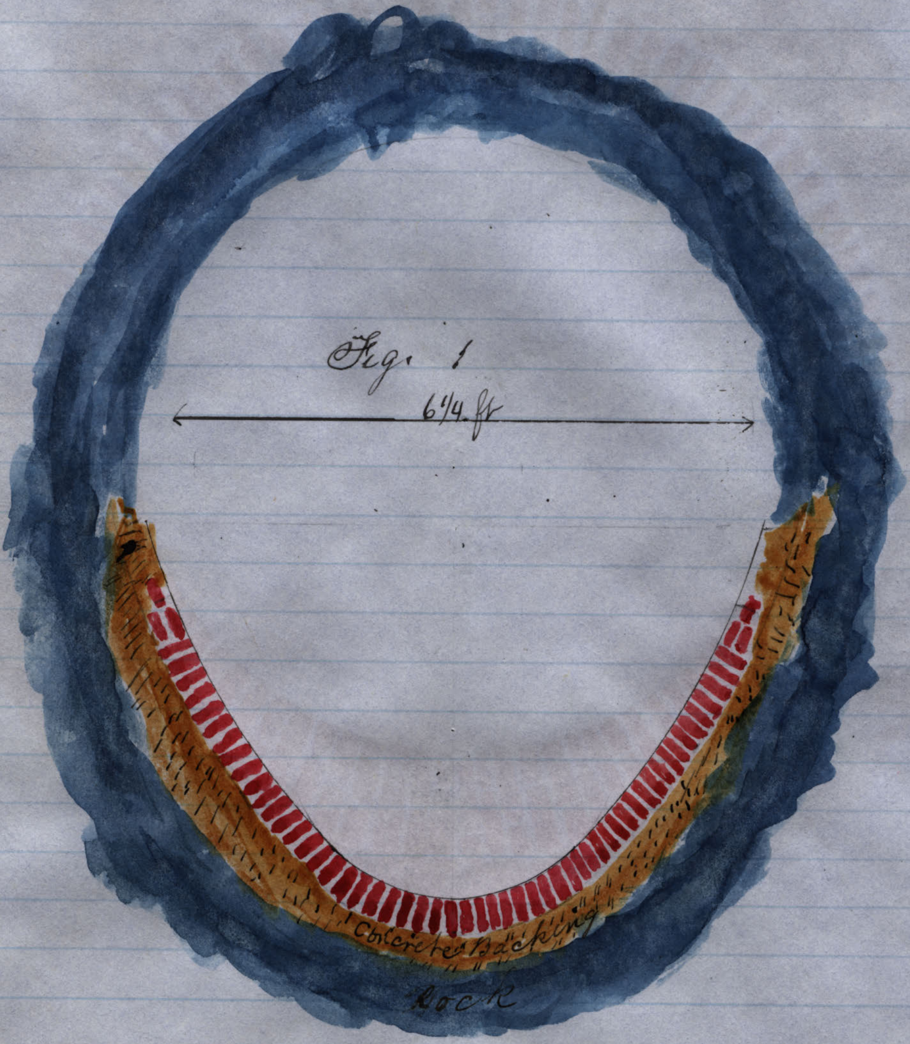
Fairmont Park Office
March 16th 1870

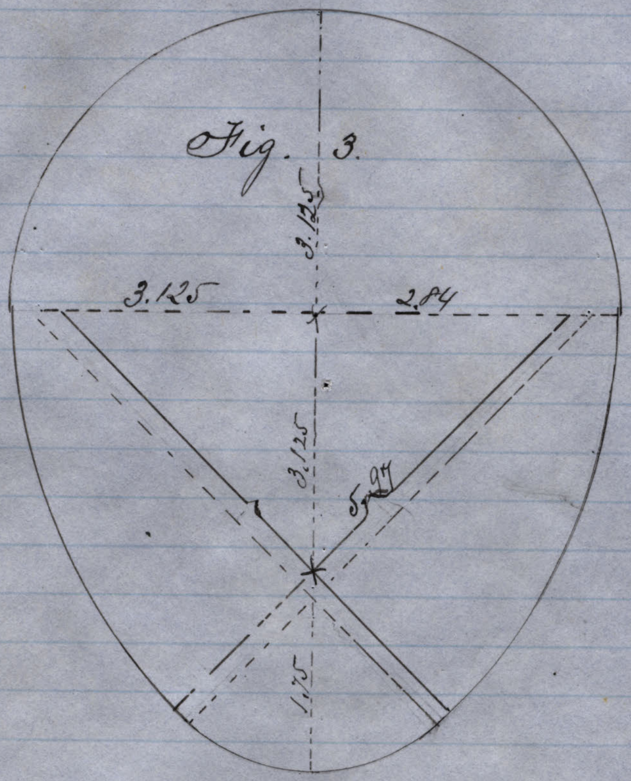
To John. D. Estabrook
Principal Assistant Engineer of Fairmont Park
Sir

To estimate the cost of the proposed Manayunk sewer closely it was necessary first to settle preliminarily on a certain sectional area and form and the following may show you what I have worked up for the subject

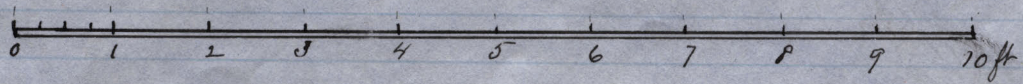
I assumed as to your statement that a Circular section of 7 feet diameter giving an area of 38.46 sq ft would suffice to take off all the sewage, that might be turned into the sewer. And considered this as a settled datum as to the Sect. Area. To get a sectional form however that would be well suited. I compared different forms used in draining the largest cities of Europe and found that regarding economy as a principle factor in our matter a close Companion was requisite between the Circular & the Eggshaped or oval form only. Fig 1&2
Considering that the Total length of the Sewer is 30.000 ft & the Total fall 25 feet. the ratio of fall is but 0.83 ft per 1000 ft. This very small descent will allow but a slow velocity to the sewage and therefore give chance to deposite solid matter. The velocity however is increased by diminishing the friction
Now assuming that the sewer will ordinarily be less than half filled the oval form has the great advantage over the circular of giving to a certain quantity of water less friction ergo greater velocity.
As an example see Fig 4 where 1.7 sq ft of water section passes over 3.5 ft in the oval and 4.2 ft in the circular form reducing the frictional area by 1/6
Therefore it seems that the oval section would be more appropriate in our case

But a strong Item speaks against this form for the upper part of the sewer on account of its having a greater vertical dimension for which reason it may interfere with the Canal at Manayunk, the Wissahickon Creek & the proposed River Road. I have compared the two more closely and have arrived at the following results See Fig 3&4





Scale 2 ft. to 1 in.



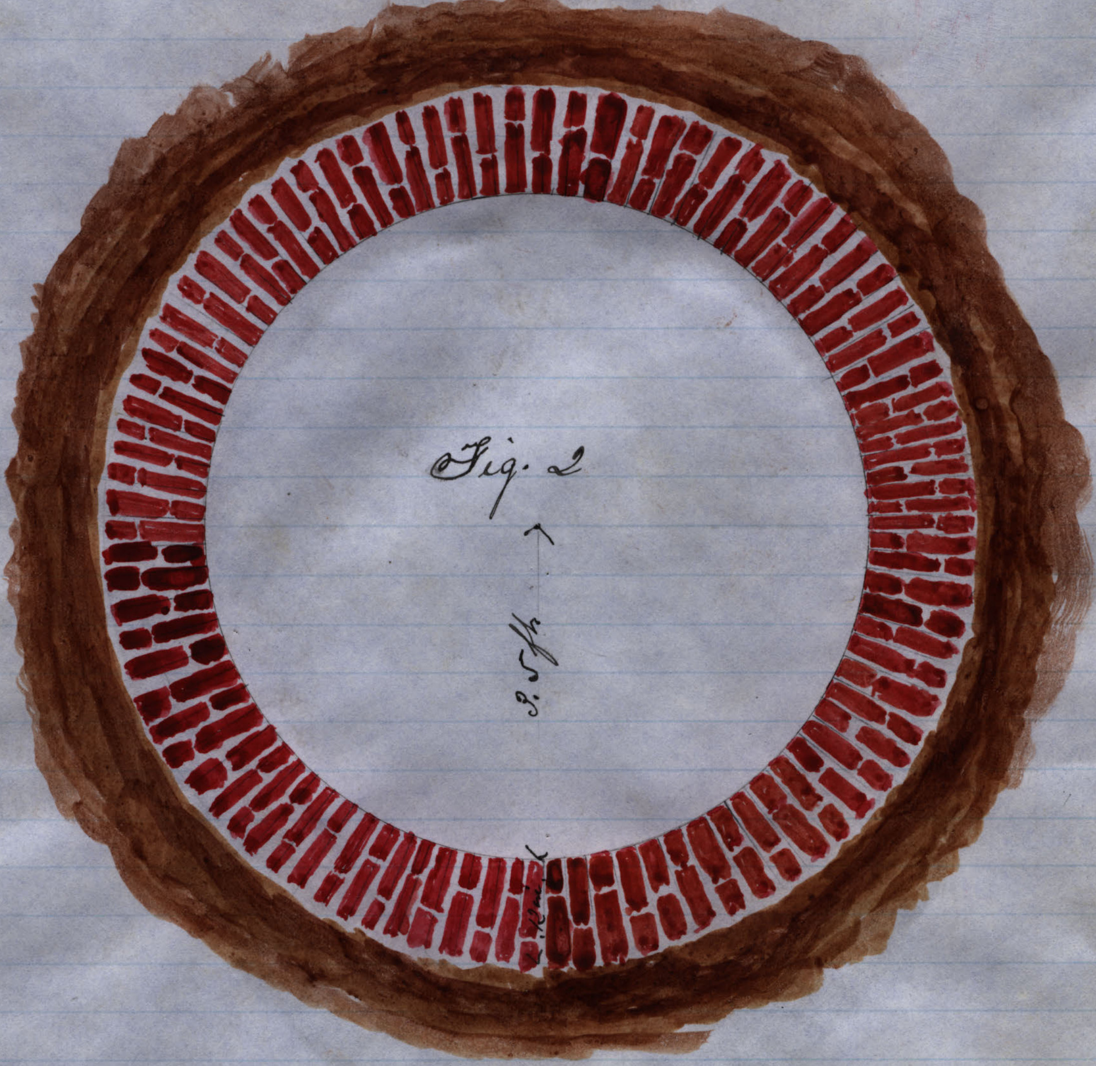


Fig. 2

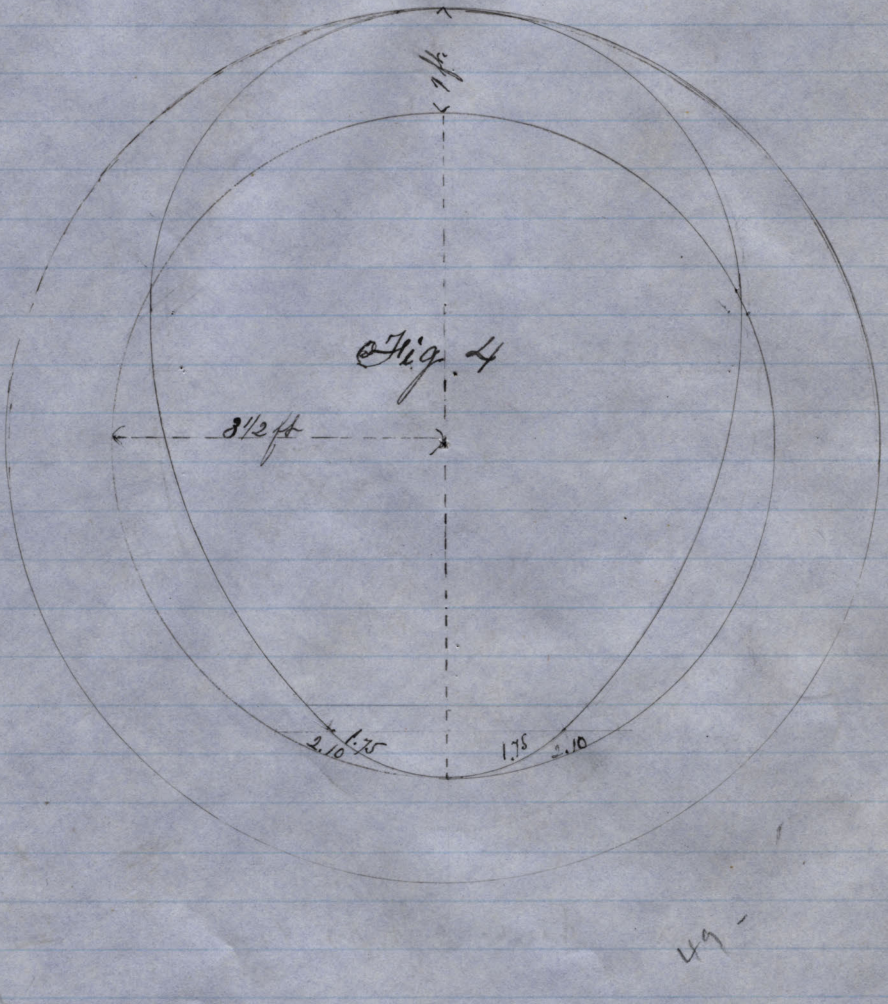


Fig. 4

3½
7
25

49

2000050001

The oval with the inscribed dimensions has practically precisely the same area as the circle of 7 ft diameter is 1 ft higher 9 in narrower and has only 3 in more circumference than the circle. increasing the cost of a brick sewer by a trifle and making no practical difference in tunnelling. If two men are at work in it the comparative room for each one is
in the Circular sect. 6 ft high 3½ ft wide
" " Oval " 6½ " " 3¼ " "
showing but a slight difference and no inconvenience in either case. In an open cut the oval would require less excavation in the width and in the lower half of section Fig. 4. From these items we see that the cost of the oval form would not be greater in tunnels and even cheaper in open cut. As it is represented in Fig 4, it also provides for the case in tunnelling through soft rock, when lining does not appear necessary till after some years. It may then be transformed into a Circular section (if wished) of the same area by working out material from the sides and bottom only, as shown in Fig 4. Taking all together it appears that the oval form as represented in the diagram would be better from the Forebay to Laurel Hill, and from there to Manayunk the Circular section might be of greater advantage on account of gaining 1 ft. in height for the objects above mentioned and with this assumption the estimate was worked out. I now state the different items and costs pr. unit that were adopted.

$ .40	Excavation of earth not near the River pr. Cub Yd		70 ¢
	do near the shore above Water Level		
$ .70	(incl occasional blasting &c) pr Cub yd		$ 1.00
$ 1.60	Excavation near the shore below water level (incl occasional dams piles &c		$ 2.00
	Tunnelling through Rock size and section above 40 sq ft section stated (incl dressing) pr. Lin yd		$ 70.00
	Add for lifting material		$ 11.00
		3) 7[illegible]	$ 81.00
$21.00	Total pr. lin ft.		$ 27.00
	Base lining of Tunnel 8 ft of perimeter with Concrete & 4 in brick paving bricks Cement. labor pr. lin ft.	$ 1.25	
	Concrete bottom	1.00	
$2.00	Total pr. lin ft		$ 2.25
	Shafts. in Rock 10×10 cost 25% higher than tunnelling incl hoisting pr lin ft.		$ 37.00
	do in earth 10×10		
	Excavation 3.70		
	Board lining etc 8.00		
	Masonry 22.30		
$ 30.00	Total pr lin ft.	$ 34.00	

line as described
Heirs of John Garrett
16.52 A.
Heirs of John Garrett
5.59 A.
Greenland Land Co
3.01 A.
Wm Blair
2 Acres
17.42 A.
Wm H. Kern
19 A.
J. B. Lippincott
Garrett
Old Robin Hood Ford
Estate of Jacob S. Waln
74 3/4 A.
Charles Dutilh
64 A. 32 P.
Samℓ Smyth
22.5 A.
PHILADELPHIA AND READING
John H. Jones
Reading R.R.
5.10 A.
Belmont Petroleum Co.
Rail Road Co
10.031 A.
Peter's Island
Knickerbocker Ice Co.
Reading
4.55 A.
Columbia Bridge
Isaac C. Jones
ROCKLAND
24 A
STRAWBERRY MANSION
George Crock
31 A. 25 P.
John J. Smith and Howard Richards
40 A.
Francis Wharton
22 A.
P. P. Randolph
29 A. 92 P.
ORMISTON
Burd Estate
27.229 Acres
BELLVILLE
Burd Estate
12.375 A.
Edward Shippen
4.855 A.
LANE
James D. Arnest
13½ A.
David Landreth
12 A. 102.5 P.
N 59° 54' E 82.67 Ps.
EDGELEY POINT
Geo. W. Ford
32.226 Acres
Henry Root
Michael Crock
20 A. 45 P.
WILLIAMS
Island 2 Acres
Granite Land Co
30 A.
Elwood Reeves
Henry Root
17 A. 102 P.
John Root
12 A.
James S. Spencer
JUNCTION
Mifflin Land Co
"see enlarged Plan"
MIFFLIN
S. F. Corlies
31 A. 122. 74 P.
READING R. R. RAIL ROAD
Boundary line as described by Act
SWEETBRIAR
Wm S. Torr
29 A.
Benjamin Orne
4.427 A.
S. H. Carpenter
4.147 A.
3.996 A.
Wm F. Misky
9.552 A
GIRARD AV BRIDGE
CONNECTING
Eggles
Wm Brown
Evans
2.4 A
Geo. Powell
2.593 A
S. Powell
2.593 A
J. P. Ferree
Cold Spring Ice Co
Solitude
Penn Estate
14.24 A.
W. P. Water Works
Est. of Ellis Yarnall Decd
18.43 A.
SPRING HILL
J. P. Ferree
SCHUYLKILL
FAIRMOUNT PARK
I
II
III
Dam
Estate of Adam Everly
Stone Quarries
Stand Pipe Lot
MANTUA
GRAPE
ELM
UNION
STORY
S. L. Smedley
GARDEN
ROCKLAND
Union Drove Yard & Hog Mkt
COLUMBIA
OXFORD
JEFFERSON
MASTER
THOMPSON
GIRARD
MOUNT PLEASANT
POPLAR
30th
40th
39th
38th

(As this comes near ~~to~~ the cost of sinking through rock, and as we do not know the geol. structure of the ground sufficient to make a separation I have entirely omitted this Item)

Shaft to build up in open cut

	Masonry, Cement & Labor pr. lin ft		$ 20.00
Manholes	Average pr piece		$ 50.00

Brick sewer in open cut

Material & Labor pr lin ft		$ 15.00
Add in some cases for extra Foundations pr lin ft	$3.00	$ 18.00

NB
1000 bricks were estimated at $ 10.00
1 bbl Cement for 1000 bricks $ 3.00
Labor for 1000 bricks $ 8.50
22 bricks pr 1 cub ft
Lumber put in place 1000 f Bd Meas. $ 50.00

Above Laurel Hill there is no question as to the general route to be pursued except in crossing the Wissahickon

Below Laurel Hill to the Forebay however there are three different lines which I have examined & for which the estimates have been made out and follow on next page

See annexed plan for route

I runs along shore (red line)
II tunnels accross under Fountain Green (Blue line)
III " " at shorter distance (Crown line)

We see that the two tunnels routes cost nearly alike, the shore route much more.

It remains though to compare other Items which may effect the cost and even decide in the end.

		Rate	I Quantity	I Cost	II Quantity	II Cost	III Quantity	III Cost
Total length	in ft		15.800 lf		13.150 lf		12120 lf	
Number of Shafts					10		10	
Length in Tunnelling	in ft	21.00 27.00	1.750 lf	36750 00 47.250 00	9.600 lf	201600 00 259200 00	10.090 lf	211890 00 272.430 00
Baselining in same	" "	2,25	1.750 lf	3.937 50	9600 lf	21600 00	10090 lf	22702 50
Total length of Shafts to sink	"	30.00 37.00			293 lf	8790 00 10841 00	421 lf	12630 00 15577 00
" " " " build up	"	20.00			46 lft	920 00	50 lf	1000 00
Length of Sewer to build in open cut	"	17.50 18.00	14050 lf	238850 00 252900 00				
" " " " " " " "	"	14.00 15.00			3550 lf	49700 00 53250 00	2030 lf	28420 00 30450 00
Excavation	Cub yds	0.40 0.70			13,685 cb yds	5474 00 9579 50	12,552 cy	5020 80 8786 40
do	"	.70 1.00			3000 c.y.	2100 00 3000 00	1000 cy	700 00 1000 00
do		1.60 2.00	47550 cy	76,080 95100 00				
Manholes	a piece	50.00	30	1500 00				
				337.117 50 400687 50		290184 00 358890 50		282362 50 351945 90

I Will help to build a large portion of the proposed River Road running under it frequently: will allow the excavated Material to be used at near distances will be able to take up all Park Drainage. Has Disadvantage of Many bends and of diminishing fall of sewer

II Will give a shorter Haul to excavated Material than III; Will give an increased Velocity compared with I; will take up a large portion of Park Drainage

III Gives the larges fall to the sewer; will further diminish the Cost as the shafts run probably through smaller per centage of rock

Has disadvantage (?) of running partly outside of Park (33rd & Thompson see plan) Some shafts May be on site of proposed new Reservoir.
From Manayunk to Laurel Hill the Sewer will run along the Bank of the River continually except in crossing the Wissahickon for which no estimate has been made
In Making out the following I have used the profile that was made under your charge some years ago

		Rate $ c	Quantity	Cost
Excavation	Cub. yds	70 1.00	91704 c yds	64192 80 91704 00
Tunnel	in ft	21 27.00	470 lft	9870 00 12690 00
Base lining in Tunnel	" "	2.25	470 lft	1057 50
Length of Sewer in open cut	" "	17.00 18.00	21430 lft	364310 00 385740 00
Waste Weir Bridge Manayunk				10400 00
Manholes	pr. piece	50.00	42	2100 00
			Total	431330 30 503291 50

Other items will increase the total cost of the sewer such as
Centering
Pumping & Lifting Engines
Engineer Corps Etc

Recapitulation

The total cost of the Sewer as to the different routes now sums up to the following

	$ I	¢	$ II	¢	$ III	¢
Wire Bridge to Laurel Hill	400687	50	358390	50	351945	90
Laurel Hill to Manayunk	503291	50	503291	50	503291	50
Add 20 % for Contingencies	180796	00	172336	00	171045	60
	1084775	00	1034018	00	1026283	00

Respectfully submitted
(Signed) R. Hering Asst Eng

	357117.50	290184.00	282362.50
	451530.30	451530.30	451530.30
	$808647.80	$741714.30	$733892.80
Add for Contingencies		148342.86	
Total		$890057.16	

Manayunk Drainage
Fairmont Park Jan. 11th 1872

John. C. Cresson Chf Eng =
Sir

A further consideration of the subject of Manayunk Drainage has suggested the following scheme which seems to possess some advantages over other projects submitted. Time has not been taken to work out details of Construction or cost. and some of the crude ideas now offered may need modification after more carefull examination

The design is as follows

1st To construct an open drainage and navigation channel from Fairmont Locks to near Falls Stone Bridge, by throwing up a continous embankment and partitioning off a part of the width of River near the Western bank.

2nd From the upper end of this open channel to Manayunk Bridge to construct a brick sewer 6 feet in diamater under the public highway near the west bank of the river.

3rd To collect the low level drainage of Manayunk into a pump well on the island near Manayunk locks and from there pump the liquid sewage through a pipe on the tow path bridge to the sewer on the west side

4th To collect the high level drainage of Manayunk in a large basin in Green lane and lead the liquid sewage to west side in a submerged pipe having a silt pocket and flush gate at its lowest point

5th To collect Falls villiage drainage and convey it accross to the open channel on the west side through a submerged pipe also provided with a silt pocket and flush gate. This pipe to cross below the Stone Bridge

For the first or open chanal portion: The channel to vary in width, but except at Bridges to be not less than 100 feet wide where the River is contracted at connecting railroad the channel to be opened West of the present Tow path. At other points the width of the channel to be regulated and the Embankments to be located so as to connect and make use of existing islands and shoals

The embankment to vary in width but to be not less than 30 ft. wide at the water surface with slopes of say 2 to 1 on channel side and 3 to 1 on river side Earth and silt dredged from the river bank to make up the embankment. Slopes to be

protected with rock. A tow path to be formed on top by constructing a Continuous line of timber crib work about 10 feet wide and filled with rock, River slopes to be planted. The length of embankment would be about 3¼ Miles or 1¼ miles on island and shoals And 2 miles in 5 to 15 ft depth of water. If we assume the amount of material required for the latter per linear yard of Embankments to be

70 cu yds Earth and Silt	@ 40¢	$ 28,	
20 " " Rock	" 1.50 "	30,	
100 Cu ft of Timber in crib	" 20¢	20	$ 78.
Or say 2 miles (3520 yds) @ $80. pr yd		$ 281.600	
And 1¼ " (2200 ") " 40 " "		88.000	
Contig	20%	73.920	
Estimated cost of 1st Section		$ 443.520	

The 2nd Section would comprise about 2½ Miles of 6 feet Sewer having a grade of about 1 per 1000

Estimated Cost of 2nd Section $ 200.000

The 3rd Section would comprise a 2 feet sewer on Manayunk island a pump of capacity to raise the contents 25 feet, And a wheel and water right of say 100 H.P.

Estimated cost of 3rd section	$ 150,000
" " 4th "	50,000
" " 5th "	100,000

Estimated Total cost

$ 943,520

The capacity of these works would be considerably greater than a continuous sewer on the east side and the cost somewhat less The sewage from East & West Manayunk. Pencoid, Falls Village. Simpsons. Sweet Briar and Mantua run emptying near 35th street would all be provided for. The only sewage not provided for would be that entering the river near Spring-Garden water works and this could be readily passed down Penna Avenue and 25th st. To collect Manayunk and Falls Village sewage and raise it 100 ft. or sufficient to let it flow into the Delaware would require engine capacity of 2000 to 3000 H. P.

Resp

(Signed) Jno. D. Estabrook
Prin. Asst Engr.

Mitchell

Impurities in Schuylkill Water
Philadelphia March 9th 1872

John C. Cresson Chf Engr
Fairmont Park
Sir

I have the Honor to submit the accompanying tabular statement of mills that are drained either directly or indirectly into the Schuylkill river withwin a few miles of where the water supply for the City is obtained. The general location, character and name of Proprietor of each mill is given in the first Column, next the distance by the water course from Fairmont forebay following that is given the amount of alkaline and bleaching materials used for reducing cleansing and whitening the stock for manufacture. The material just named together with the impurities from the stock all pass into the residumn of sewage, no part, it is claimed is retained in the manufactured product The amount used pr day of the different kinds of soap lime soda potash and bleaching powder foots up for all the mills full 22 Tons That is an average of 22 tons pr day Counting every day in the year. Of alkaline and caustic earth flowed into River & other impurities entering into the stream at the same time neutralize the caustic effect and in some instances a small proportion of these materials may be removed in a solid state, but a very large proportion goes into the River. In the next several columns in the table are given the amounts of dyes and mordants. Certain proportion of these undergo chemical changes and are fixed in the manufactured goods; other portions become insoluble and are precip-itated either in the process of dyeing or after they reach the river, The most bulky residuum from this class of material comes from the ground dye woods (Chiefly Logwood) some attempt is made in a few instances to keep this from the river, but much that is kept from going in directly is swept down by freshet. Probably the waste Logwood dye is more conspicuous and can be traced further in the river than any other impurity.
At the uppermost woolen mill in Manayunk the strongly colored stream is formed and flows on in a narrow channel following near the

eastern shore of the river and gradually increasing by additions from the other mills. Still the colored stream retains its narrow width and seems to have little affinity for the clearer waters of the river but follows the sinuosities of the Eastern shore and can be distinctly traced to the upper end of Falls villiage. Opposite the Falls it is generally not so conspicuous but from Dobson's Mill and Littlewood. Lancaster's Falls Dye works a large addition of coloring matter comes in which shows itself as far as Laurel Hill Landing. From these obsersevations it would seem that generally the impuri-ties (at least those in suspension if not those in solution) do not enter or cross the main river channel and consequently that the water fed to the Schuylkill and Fairmount Works would carry impuritice's from the falls and Manayunk which Belmont Works would get only those from Simpson's and Montgomery Co.

The great source of organic impurities in the water is probably from wool scouring It is estimated that full 40 percent. of the gross weight of the wool used is animal fat. All of which in the process of scouring passes into the river.

Another large amount of such material comes from the oils added to woolen yarns and then washed out. Taking 40 per cent of the wool scoured as shown by the table and adding the oil it gives over 8000 lbs or nearly 4 tons as the weight of animal fat put in the river pr day The alkalies used in cleansing convert the fats into soluble soaps which when reaching other impurities in the river may undergo further chemical changes and be precipitated as insoluble com-pounds. Paper Mills that do not evaporate their spent caustic liquors left after reducing wood and straw to pulp waste into the river large amounts of akaline solution and floating impurities (reduced vegetable cellular matter &c) The Word Pulp Co. claim to evaporate all caustic liquors and to save about nine-tenths of their daily consumption.

It will be seen that the amount of soda ash returned from their works in the table is very small compared with the other ingredients. The amount given is only the waste that has to be made good every day.

The enclosed report of Mr. Ralston will give some idea of the impurities entering the river through the stream that passes near Schuylkill (Spring Garden) Water works. The ordinary flow of this stream could readily be directed into a sewer in Pennsylvania Avenue and thence to the river below the dam. As these impurities are rapidly increasing and as they enter the river so much nearer the waterworks than the others it becomes neccessary that some provision should very soon be made for their removal.

The same report gives a statement of the establishments on Mantua Run that enters the river from the West not far above Fairmount locks. Water from this stream would very seldom if ever flow across to Fairmount works, but impurities from it are being deposited above the locks and when the river is low and covered for some time with ice exhalations from these deposites must impregnate a large proportion of the water in the lower part of the pool.

In Manayunk there are several sewers emptying into the river that convey some house drainage but they were constructed mostly to carry off the overflow from springs and for general surface drainage. During showers a vast amount of sand and dust is swept into the river through these sewers, but the ordinary flow of sewage is very small. In time the more general introduction of water into dwellings will increase this

To return to the tables again one column gives the estimated amount of sewage. It is obtained by learning the capacity of the pipes that supply water for scouring & dyeing and also the number of hours they are in use for that purpose.

In some of the paper mills the water is running continuously throughout the 24 Hours. while in most of the mills such pipes are not in use one fourth of the time. In the next column in the table the size of opening into the sewer required for each mill is given. That is such

as to carry off promptly the greatest flow
supposing the stream to have a velocity
if all of the sewage be collected into a sewer having a suffecent fall to give a velocity of 3 ft per second
of 3 ft per second (say about 1 pr 1000 for a
sewer 6 feet in diameter) then the combined
sewage from all of the mills at the Falls
would form a stream having a cross sec-
tion of about 123 sq inches, supposing it to be
supplied to the sewer so as to give a uniform
Continuous flow throughout the whole 24
hours of the day. And similarly for Manayunk
mills, the cross section would be about
475 sq inches and for mills in Montgomery
County about 127 sq inches or say 725 sq in
for the three places. But the sewer must
be of capacity to carry off in 12 hours about
the whole supply for 24 hours or have a
cross section of double the above area
with the addition of about 250 sq inches
for existing sewers and house drainage
say in all 1700 sq inches or a little less
than a section of a sewer 4 feet in diameter

This leaves out the Wissahickon
Territory which could not be drained at
any reasonable cost.
The law in regard to putting impurities
into the river must be enforced there.
A sewer 4 feet in diameter would
therefore supply the ordinary demands of exist-
ing mills and house drainage but to accom-
odate the probable increase in business and
population it is recomended to furnish
for the drainage of Manayunk and Mont-
gomery Co a sewer 6 feet in diameter or
about three times the present demand and
below the Stone Bridge to empty both these
and the drainage from the Falls into an
open canal to be used for both drainage
and navigation as proposed in a previous
report. The ordinary flow of sewage
supplies water enough to pass full 60
Boats through the locks per day. If
this Amount of Water be diverted and
carried to below the dam in sewers it
will seriously affect navigation in dry
weather while if an open canal is
provided for it, none need be wasted

Respectfully
(Signed) John D Estabrook
Prin. ~~Asst~~ Engr.

Fairmont Park February 29/72

Report of Establisments &c draining into the Creek that passes near Spring Garden Water Works

On the East side of the Schuylkill River. "Iklemans" Hotel and Brewery on Thompson st ab 31st street All refuse stuff and water closets, drain into Culvert through which all the filth of the Ravine passes.

About 6 Breweries south of Master and East of 33 and st empty refuse water into a pond N. W. of 33 and st. which Overflows and finds its way into the River

A. Pond of stagnant water is situated east of 31st st and south of Thompson

"Herman Schecks" Slaughter house on 31st st south of Master averages 5 Beef Cattle and 15 Hogs per week: filthy water Closet with the refuse matter drain into the Ravine.

Five large Hogpens and piles of Manure are situated in the neighborhood of 28th & Oxford streets on the hill above ravine and all drain into it.

A Slaughter house with large quantities of garbage in the yard and very offensive is also situated in same locality. about 26th & Oxford sts.

Three large Hogpens are situated in the locality of 28th & Master st. very filthy and all drain directly into ravine

There are 3 large hog slaughter houses (one very large) in the neighborhood of 28th and Master sts draining directly into ravine.

Pond 30th and Master into which most of the hog pens and slaughter houses empty and from thence to culvert.

Establishments draining into Mantua Run

On the West side of Schuylkill river there are four small hogpens situated on the ravine south side of Penn. R. Road and close to it.

Gross slaughter House corner of 39th & Elm st. Kills about 100 Hogs and 12 Beef cattle per week. Connected with this Establishment there is a large packing house in same block. Also a block of dwelling houses situated between 38th & 39th & Haverford & Storey streets and another between 38th & 39th ~~on~~ north side Story and south side of Elm, in all about 125 Houses all of these with the above slaughter house drain into ravine

Andrew Schindeys hog Slaughter house S. W. Cor. of 39th & Story st averages about 25 Hogs per week

"Pearsons" hide and fat Establishment next door to Schindeys Slaughter house. A Pauls sheep slaughter house and yard next to "Pearsons" average 100 sheep per week all the refuse stuff of the last three drain into this rabine

Beef Slaughter house in Story below union st average about 20 Beef Cattle per week

Story st above union Large quantity of blood and filth standing in gutters and street, from slaughter Houses above.

John Pearce's Sheep slaughter House on South side of Story st averages about 70 sheep per week refuse stuff runs into gutter on Story st, and thence to sewer inlet.

Two more sheep slaughter houses in same block. Average the same and their drainage the same.

Wallace's veal slaughter house on the Corner of Story & Preston sts.

"Cettenholtz" sheep slaughter house next door to "Wallace's" average about 200 sheep per week drainage same as above.

Beef Slaughter House on Haverford st, above 38th st, average about 12 beef cattle per week. refuse drains into street gutter

Hog slaughter house Haverford st above 39th st Average about 20 hogs per week refuse stuff drain into gutter on Haverford st

(Signed) Robert S. Ralston

Statement of the Average Daily Consumption of Drugs &c

used for washing scouring and dyeing at the various manufacturing Establishments that drain into the Schuylkill River between Fairmount and Flat Rock Dam. The Quantities consumed in the year 1871 were obtained from the Managers of the Mills and the Amounts given below are those yearly quantities divided by 365. The whole consumption was taken not the waste alone

Falls of Schuylkill and Wissahickon 1871	Dist from Fairmount Forebay	Soap	Bleaching Powder	Lime	Soda Ash	Sal Soda Potash & Aqua Ammonia	Allum, Blue Stone & Copperas	Iron Liquor & Nitrate Iron	Bartin & Muriate Tin	Argal & Cream Tarter	Accetate & Nitrate Lead & Litharge	Bichromate & Prussiate of Potash	Aniline Salts	Pyroligneous Acid	Oxalic Acid	Muriatic Acid	Oil of Vitriol Aqua Fortis
	miles	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
West Falls Calico Print Works Wm Simpson & Sons	3½+		30	1342	130	126	217						40	110			307
Falls Woolen & Cotton Dye works Littlewood & Lancaster	3½+				70		91					34					4
Falls Woolen Mills John Dobson	3¾	444			304	6	85	22	8	31		27			25	33	48
Falls Chemical Works Powers & Weightman	4																
		444	30	1342	504	132	393	22	8	31		61	40	110	25	33	359
		444	30	1342	504	132	393	22	8	31		61	40	110	25	33	359
Wissahickon Woolen & Spinning Mill James Dobson	4½				12												
Wissahickon Shoddy Mill Mrs. Greenwood	5½																
Rittenhouse Creek or paper mill run { Woolen & Shoddy Mill E.H. Ammidown	5¾	290			55	7	1		15	3		21				43	7
" " White cotton laps McKell & Bros	6																
" " Glen Echo Carpet Mills McCallum Crease & Sloan	7½	9			45		18		6	20		7				50	19
Wissahickon Red Bridge Woolen Mills Joseph Seathard (lessee)	6				11												
Wissahickon Shoddy Mill Jos. G. Kitchen	6¾																
" Cotton Spinning Mill J. Livezey	7¾																
Gorgas Creek Shoddy Lape M. Gorgas	7¾+						3.										
" " Custom Wool dyeing Robt Haley	8																
" " Chemical works C.J. Crease	8½																
Wissahickon Glen Fern Grist Mill Thos. Livezey	8																
Creasheim Creek Cotton & Shoddy J. Hill	8¾																
" " Creasheim Cotton Mill J. Hill	9																
" " Pleasant Cotton Spinning Mill J. Carr	9½																
" " Shoddy & Carpet Mill David Hay	9¾																
" " Cedardale Woolen " " "	10	1			8		3						1			1	1
Wissahickon Paper Mill Chas Magarge	9		375	1800			½				4	2					
" " " Ed. Magarge	10																
" Woolen " Chas Dean	10¾		225	700													
Total for Wissahickon & Tributaries		300	600	2500	121	7	25½	0	21	23	4	30	1	0	0	94	27
" " " " Falls of Schuylkill		744	630	3842	635	139	418½	22	29	54	4	91	41	110	25	127	386

Falls of Schuylkill and Wissahickon 1871	Cochineal & Lac Dye	Indigo & Indigo Preperation	Catechu	Extract Logwood	Chipped Logwood	Fustice, Barwood Limawood Hypernic & Cudbear	Sumac & Quercitron Bark	Extract Quercitron Bark	Madder	Oil added to yarn in manufacture & then washed out	Wool & woolen materials scoured they loose in weight from 25 to 65%	Size of Pipes supplying water that forms sewage generally not flowing all the time	Estimated Amount of sewage per day	Cross section of largest sewage stream in each mile in drain 6ft diameter 1 per 100 grade & 3ft per second velocity	Remarks
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs		Gallons	sq in	
West Falls Calico Print Works Wm Simpson & Sons				113	803		112			33		200gal per min	1200000	215	Whiting 160 lbs Sulphur 2 lbs; Acetate Lime 79 " Lemon juice 21 "; Nitrate Soda 13 " Rosin & Gums 25 "; Sal Ammonia 7 Starch & Flour 374. Glue Caseine & alb 25 lbs
Falls Woolen & Cotton Dye works Littlewood & Lancaster		23	140	207	276	23	58				55	Water from Spring constant flow 30gal per min	44000	13	
Falls Woolen Mills John Dobson	30	8			933	111	69		4	524	8707	2-3" pipes 6ft Hd 16.1" " 14" "	400000	60	
Falls Chemical Works Powers & Weightman														6	The only liquid wast is about 100gal per day of alum liquor very weak the well on our side of the valley below still have good water
	30	31	140	320	2012	134	239		4	557	8762		1644000	294	
	30	31	140	320	2012	134	239		4	557	8762		1644000	294	
Wissahickon Woolen & Spinning Mill James Dobson											2000	3" pipe 6ft Hd 8 hrs in 24 120 gal per min	58,000	13	
Wissahickon Shoddy Mill Mrs. Greenwood															Some dust from rag picking but no dyeing or scouring. Coarse Rag waste sold for roff— paper stock
Rittenhouse Creek or paper mill run { Woolen & Shoddy Mill E.H. Ammidown	17				42	2				85	3300	9" pipe 6ft Hd 2000 gal per min	1,200,000		
" " White cotton laps McKell & Bros															No deleterious drainage
" " Glen Echo Carpet Mills McCallum Crease & Sloan		5			65	82					150	4" pump 66 ft per min	40,000		The City has an injunction against McCallum against draining into the Germantown water works the draining is now filtered and pumped into adjoining fields and hill sides
Wissahickon Red Bridge Woolen Mills Joseph Seathard (lessee)											55	2" pipe 3ft Hd 1 hr. in 24 30 gal per min	1000		
Wissahickon Shoddy Mill Jos. G. Kitchen															Some dust from Rag Picking but no dyeing Scouring
" Cotton Spinning Mill J. Livezey															No deleterious drainage
Gorgas Creek Shoddy Lape M. Gorgas					250							2" pipe 3ft Hd 1 hr in 24 32 gal per min	2000	4	Dust from rag picking No dyeing or Scouring
" " Custom Wool dyeing Robt Haley		5									290				Dye house only in operation Mill house burned
" " Chemical works C.J. Crease															(Estimates greatest waste per day to be. Sulphur 15 lbs. Potash 9 lbs. Lime 2 lbs. Sal Soda 4 lbs Com. Salt)
Wissahickon Glen Fern Grist Mill Thos. Livezey															No deleterious drainage
Creasheim Creek Cotton & Shoddy J. Hill															Some dust from Rag picking No dyeing or Scouring
" " Creasheim Cotton Mill J. Hill															(There is a dye house but it is not in use for two years past No Scouring)
" " Pleasant Cotton Spinning Mill J. Carr															
" " Shoddy & Carpet Mill David Hay															No dyeing or Scouring
" " Cedardale Woolen " " "		1		1	260	7					236	2" pipe 6 ft Hd 3" " 10 " " 4 hrs. in 24 160 gal per min	40,000		Some dust from rag picking No dyeing or Scouring
Wissahickon Paper Mill Chas Magarge															
" " " Ed. Magarge															
" Woolen " Chas Dean															Mill has been dismantled Property sold to the City
Total for Wissahickon & Tributaries	17	11	0	1	617	91	0	0	0	85	6031				
" " " " Falls of Schuylkill	47	42	140	321	2629	225	239	0	4	642	14793				

Statement of the Average Daily Consumption of Drugs &c (Continued)

Manayunk	Dist from Fairmount Forebay	Soap	Bleaching Powder	Lime	Soda Ash	Sal Soda Potash & Aqua Ammonia	Alum Blue Stone & Copperas	Iron Liquor & Nitrate Iron	Bartin & Muriate Tin	Argal & Cream Tartar	Acetate & Nitrate Lead & Litharge	Bichromate & Prussiate of Potash	Aniline Salts	Pyroligneous Acid	Oxalic Acid	Muriatic Acid	Oil Vitriol & Aqua Fortis
	Miles	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Manayunk Perseverance Cotton Mill Fitzpatrick & Holt	5+																
" New Mill not completed A. Barr & Bros	5+																
" Gas works. City	5+																
" Burnt Mill John Maxson	5 1/4																
" Lincoln Cotton & Woolen Mill D. Wallace & Sons	5 1/4+				6							3					
" Dexter " " " Heft & Ogle	5 1/4+	117			133		5				10	17	1			7	7
" " " Sevil Schofield	5 1/2-	212			181	27	38	50		4					14	1	1
" Schuylkill Cotton Mill A. Campbell & co	5 1/2+			90	21		51					12					
" Blantyre " & Woolen " E. Holt (lessee)	5 1/2+				7		6										
" Inquirer Paper " W. W. Harding	5 3/4+		820	2300	1370		246										40
" Ryska Cotton Mills Robt Patterson	5 3/4+				57	3	96				10	19				5	5
" Eagle Cotton & Woolen Mill Wm Steel	6-				8	1	7		1								1
" Cotton Spinning " J. B. Winpenny	6-																
" " & Woolen " Preston & Irwin	6+				10		8	1	1		1	2	1	1		3	1
" Crompton Cotton " A. Campbell & co	6+			36	29		5					6					
" Roof Paper " Jos. Stelwagen	6+			10													
" Pekin Cotton & Woolen " S. J. Solms	6 1/4-				60		26					8				7	
" Shoddy Mill Thos. Schoefield	6 1/4																
" Grist " Chas. Delaney	6 1/4+																
" Roof Paper " W. H. Duckett	6 1/2-			312													
" " E. Waltzfelder & Co	6 1/2-			7	4		8				1	3					
" Cotton & Woolen " Preston & Irwin	6 1/2-				20		16	1	1		2	4	1	2		6	1
" Flat Rock Paper " M. Nixon	6 1/2		1233	1650	1050												30
" Wood pulp Works. Jessups. Moore & Nixon	6 1/2																
" " " " " "	6 1/2+		3200	19000	4500												
" Canton Cotton & Woolen Mill Fitzpatrick & Holt	6 1/2				8		5					3	1				2
" Little Falls. Shoddy & Woolen Spinning Mill Stafford & Co	6 3/4																
		239	5253	23405	7464	31	517	52	3	4	24	77	4	3	14	29	88

Manayunk	Cochineal & Lac Dye	Indigo & Indigo Preparation	Catechu	Extract Logwood	Chipped Logwood	Fustice Barwood Limawood Hypernic & Cudbear	Sumac Quercitron Bark	Extract Quercitron Bark	Madder	Oil added to yarn in manufacture and then washed out	Wool and woolen materials scoured they lose in weight from 20 to 65 %	Size of Pipes supplying water that forms sewage generally not flowing all the time	Estimated Amount of Sewage per day	Cross section of largest sewage stream for each mile in drain 6 ft diameter 1 per 1000 grade and 3 ft per second velocity	Remarks
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs		gallons	sq in	
Manayunk Perseverance Cotton Mill Fitzpatrick & Holt				22									300	1	All the sewage and all the Dyeing done at another mill
" New Mill not completed A. Barr & Bros															Not yet in operation
" Gas works. City												1 pipe 15 ft H d. Constant flow 12 gals per min	18000	2	Some waste of coal tar Sulphate lime Ammonia &c
" Burnt Mill John Maxson															
" Lincoln Cotton & Woolen Mill D. Wallace & Sons			25		95						30		300	1	Not yet rebuilt (Said to be sold to Littlewood Lancaster Dyers at the Falls
" Dexter " " " Heft & Ogle		23	116		433	100	33	47			58	2.5" pipes 12 ft H d 14" " 12" " 1850 gal per min	300000	140	
" " " Sevil Schofield			19		105	43	38			450	3000	4.6" pipes 5 ft H d 2400 gal per min	800000	250	
" Schuylkill Cotton Mill A. Campbell & co		83	68	43								3" pipe 5 ft H d 50 gal per min	60,000	11	
" Blantyre " & Woolen " E. Holt (lessee)				61							28	1/2 of 2" pipe 40 ft H d 50 gal per min	25000	6	
" Inquirer Paper " W. W. Harding												6.5" pipe 3 ft H d 2700 gal per min	3500,000	285	The Chief Engineer of the Schuylkill Nav. Co through the P. & R. Co complains of deposites in the river from the mill. of Ashes &c
" Ryska Cotton Mills Robt Patterson		10	91	150	2	44	38	3				6 in pipe 3 ft H d 2 hrs in 24 800 gal per min	100 000	85	
" Eagle Cotton & Woolen Mill Wm Steel			14	26	8	5	10					6 in Pipe 5 ft H d 550 gal per min	100 000	60	
" Cotton Spinning " J. B. Winpenny														1	No drugs or filthey drainage
" " & Woolen " Preston & Irwin	1	1	25	50		6	3				35	6" pipe 4 ft H d 450 gal per min	80000	48	Lately purchased from J. B. Winpenny
" Crompton Cotton " A. Campbell & co		32	12	21		21			5			2" pipe 4 ft H. d	10000	3	The stock is chiefly Shoddy waste & paper pulp not waisted
" Roof Paper " Jos. Stelwagen												2.5" pipe 18 ft H d or 2 in " 30 ft " 400 gal per min	10000	3	
" Pekin Cotton & Woolen " S. J. Solms			70	175		70					275		50000	30	
" Shoddy Mill Thos. Schoefield															
" Grist " Chas. Delaney															Some dust from rag picking no dyeing or Scouring
" Roof Paper " W. H. Duckett												24" pipe 9 ft H d 600 gal per min	10000	60	
" " E. Waltzfelder & Co		5	15	4					2				2000		
" Cotton & Woolen " Preston & Irwin	1	1	50	100		11	5				11	5.12" pipe 5 ft H d 550 gal per min	10000	60	(Same as W. W. Harding)
" Flat Rock Paper " M. Nixon												3" pipe 15 ft H d 5 1/2" " 5 " " 4" " 5 " " 900 gal per min	600,000	100	Same as W. W. Harding also the Caustic Liquor is evaporated and used repeatedly so there is littel drainage in proportion to drugs used
" Wood pulp Works. Jessups. Moore & Nixon															
" " " " " "												6.2" pipes 10 ft H d 250 gal per min continuously also 60000 per day that is evaporated	500 000	60	Same as above
" Canton Cotton & Woolen Mill Fitzpatrick & Holt			17	14	3	6	40				70	4" pipe 3 ft H d 150 gal per min	30000	16	
" Little Falls. Shoddy & Woolen Spinning Mill Stafford & Co														1	No dyeing or Scouring
	2	155	522	1099	403	239	181	3	7	450	3564		6391,000		

Statement of the Average Daily Consumption of Drugs. &c (Continued)

Montgomery Co.

Montgomery Co.	Distance from Fairmount Forebay	Soap	Bleaching Powder	Lime	Soda Ash	Sal Soda Potash & Aqua Ammonia	Alum Blue Stone & Copperas	Iron Liquor & Nitrate Iron	Barkin & Muriate Tin	Argal & Cream Tartar	Acetate & Nitrate Lead & Litharge	Bichromate & Prussiate of Potash	Aniline Salts	Pyrolignous Acid	Oxalic Acid	Muriatic Acid	Oil of Vitriol & Aqua Fortis
	miles	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Schuylkill Pencoid Iron works A. & P. Roberts & co																	
Vine Creek Vine Creek Cotton Mill Wm Clegg & Bros	6-				4		3										
Schuylkill, New Union Cotton & Woolen Mill John Campbell & Sons	5¾-																
Rock Hill Creek Ashland Paper Mill S. A Rudolph	6-		1500	3000	4000												
Rock Hill creek Rock Hill Woolen & Spining Mill R. Schofield Jr. & Bro	6+																
" " " " " Creek Cote W. Mills John Dolson	6½																
" " " " " " " " " Jas Lees & co	6½+																
Schuylkill Ashland Spining Mill, A. Thatte & Bros	6½																
			1500	3000	4004		3										

Montgomery Co.	Cochineal & Lac Dye	Indigo & Indigo Preperation	Catechu	Extract Logwood	Chipped Logwood	Fustic Barwood Limawood Hypernic & Cudbear	Sumac Quercitron Bark	Extract Quercitron Bark	Madder	Oil added to yarn in manufacture and then washed out	Wool & Woolen materials scoured they loose in weight 20 to 65%	Size of Pipes supplying that from sewage Generally not flowing all the time	Estimated amount of sewage per day	Cross section of largest sewage stream for each mile in a grade 6 ft. diameter 1 per 100 grade & 3 ft per second velocity	Remarks
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs		gallons	sq in	
Schuylkill Pencoid Iron works A. & P. Roberts & co															No water used except for cooling Rolls all Privies have wells
Vine Creek Vine Creek Cotton Mill Wm Clegg & Bros				43									1000	1	No dyeing or Scouring except some black spent Liquor not drawn off No waste but leakage
Schuylkill, New Union Cotton & Woolen Mill John Campbell & Sons															No dyeing or Scouring
Rock Hill Creek Ashland Paper Mill S. A Rudolph												8" Pipe 6 of Hd night & day 1200 gal per min	1,700,000	130	This mill at the mouth of Rock hill creek has an older claim than the 3 mills further up the creek and protests against their discoloring the water with dyes &c
Rock Hill creek Rock Hill Woolen & Spining Mill R. Schofield Jr. & Bro															No drugs used in summer wash about 3000 lbs of wool with water alone
" " " " " Creek Cote W. Mills John Dolson															No scouring or dyeing
" " " " " " " " " Jas Lees & co															No Scouring or dyeing
Schuylkill Ashland Spining Mill, A. Thatte & Bros															Some Shoddy waste but no dyeing or Scouring
				43									1,701,000	131	